

Name SOLUTIONS.

Teacher _____

1st Year Mathematics
March assessment

You may **not** use a calculator for this assessment.

You must show all your working out.

Section A – mastery

[37]

1. Work out the following, giving answers in simplified form.

(a) $\frac{3}{7}$ of 63

$$\frac{3}{7} \times \overset{\textcircled{\text{M1}}}{63} = 27$$

Answer

$$27 \text{ } \textcircled{\text{A1}}$$

(2)

(b) $\frac{2}{5} \times \frac{5}{8}$

$$\frac{2}{\cancel{5}} \times \frac{\cancel{5}}{8} = \frac{2}{8} \text{ } \textcircled{\text{A1}} = \frac{1}{4}$$

Answer

$$\frac{1}{4} \text{ } \textcircled{\text{A1}}$$

(2)

(c) $\frac{5}{6} - \frac{1}{4}$

$$\frac{5}{6} - \frac{1}{4} = \frac{10}{12} \text{ } \textcircled{\text{M1}} - \frac{3}{12} = \frac{7}{12}$$

Answer

$$\frac{7}{12} \text{ } \textcircled{\text{A1}}$$

(2)

(Total 6 marks)

2. a) Convert $\frac{19}{3}$ to a mixed number

Answer

$$6\frac{1}{3} \text{ } \textcircled{\text{A1}}$$

(1)

b) Convert $3\frac{7}{8}$ to an improper fraction.

Answer

$$\frac{31}{8} \text{ } \textcircled{\text{A1}}$$

(1)

(Total 2 marks)

3. Solve the following equations, showing all your working out:

(a) $9t - 5 = 22$

$9t - 5 = 22$ (A5)
 $9t = 27$ (M1)
 $t = 3$ (A1)

Answer $t = 3$ (A1) (2)

(b) $5p - 12 = 11p + 3$

$-12 - 3 = 11p - 5p$ (M1)
 $-15 = 6p$ (A1)
 $-\frac{15}{6} = p \rightarrow$ Now cancel.

Answer $p = -2\frac{1}{2}$ or $-\frac{5}{2}$ (A1) (Accept) (3)
 (Total 5 marks)

4. Fill in the missing numbers:

(a) $7 - \boxed{-2} = 9$ (A1)

(b) $-27 \div \boxed{-9} = 3$ (A1)

(Total 2 marks)

5. If $a = 4$, $b = -3$ and $c = 2$ calculate:

i) $5b + c$ (M1)
 $= 5 \times (-3) + 2 = -15 + 2 = -13$ (A1)

ii) $6(a - b)$ (M1)
 $= 6(4 - (-3)) = 6 \times 7 = 42$ (A1)

(Total 4 marks)

6. Simplify the expressions below as far as possible:

a) $10m - m$ $9m$ (A1)

b) $5a + 7b + 10 - 4a - 9b - 13$

..... $= a - 2b - 3$
 (A1) (A1) (A1)

(Total 4 marks)

7. (a) Write down the next two terms in this sequence:

$50, 48, 44, 38, 30, \boxed{20}, \boxed{8}$
⁻² ⁻⁴ ⁻⁶ ⁻⁸ ⁻¹⁰ ⁻¹²
 (A1) (A1)

(2)

(b) The n th term rule for a sequence is $5n - 3$

(i) Write down the first three terms of the sequence.

..... $n=1 \quad 5 \times 1 - 3 = 2$
 Answer $2, 7, 12$
 (A1) (A1)

(2)

(ii) Is 121 a term in this sequence? Explain your answer.

..... No, terms in the sequence either end in a 2 or a 7 - 121 ends in a 1. (A1)

(1)

(Total 5 marks)

8. A sequence of numbers is shown.

$7 \xrightarrow{+3} 10 \quad 13 \quad 16 \quad 19$

a) Find an expression for the n th term rule for the sequence.

..... $3n + 4$
 (A1) (A1) (A1)

(2)

b) Find the hundredth term in the sequence given in part a).

..... $n=100 \Rightarrow 3 \times 100 + 4$
 Answer 304 (A1)

(1)

(Total 3 marks)

9. A type of wood has a density of 0.8 grams/cm³. A piece of this wood is 3cm by 10cm by 15cm. What is the mass of this piece of wood in

a) grams? $\text{Density} = \frac{\text{Mass}}{\text{Volume}}$ $\text{Volume} = 3 \times 10 \times 15 = 450 \text{ cm}^3$ (M1)
 $0.8 = \frac{4}{5}$
 $\frac{4}{5} \times 450 = 360$ $\therefore \text{Mass} = \text{Density} \times \text{Volume}$
 $= 0.8 \times 450$ (M1)

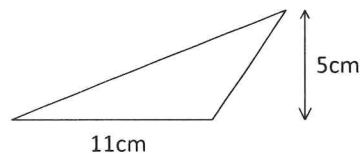
Answer 360 (A1) grams
 (3)

b) kg?

Answer 0.36 (A1) kilograms
 (1)

(Total 4 marks)

10. Calculate the area of the triangle below.



$\text{Area} = \frac{\text{base} \times \text{height}}{2} = \frac{11 \times 5}{2} = 27.5$ (M1)

Answer 27.5 (A1) cm²
 (2)

(Total 2 marks)

Section B – Problem Solving

[33]

11. a) Lucy makes some curtains for her living room and her bedroom.

In the living room she uses $3\frac{2}{3}$ metres of material.

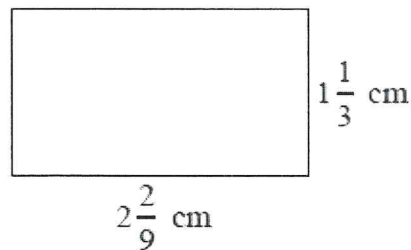
In the bedroom she uses $2\frac{4}{5}$ metres of material.

How many metres of material does she use altogether?

$$3\frac{2}{3} + 2\frac{4}{5} = 3\frac{10}{15} + 2\frac{12}{15} = 5\frac{22}{15} = 5 + 1\frac{7}{15} = 6\frac{7}{15}$$

Answer $6\frac{7}{15}$ (A1) m (3)

b) Calculate the area of the rectangle below:



$$\text{Area} = 2\frac{2}{9} \times 1\frac{1}{3}$$

$$= \frac{20}{9} \times \frac{4}{3} \quad \text{(M1)}$$

$$= \frac{80}{27} \quad \text{(A1)}$$

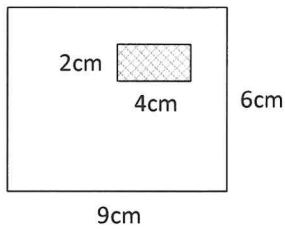
$$2 \times 27 = 54$$

$$3 \times 27 = 81$$

$$= 2\frac{26}{27} \quad \text{(M1) (A1)}$$

(4 marks)
(Total 7 marks)

12. Work out what fraction of the shape below is shaded, giving your answer in simplified form.



Shaded area = $2 \times 4 = 8$ (M1)
 Big Rectangle = $6 \times 9 = 54$ (M1)
 Fraction shaded = $\frac{8}{54} = \frac{4}{27}$
 Answer $\frac{4}{27}$ (A1)

(Total 3 marks)

13. A box has dimensions 10cm by 8cm by 6cm. Dice of side 2cm are to be packed into this box. What is the largest number of dice the box will hold?

10cm \Rightarrow 5 dice }
 8cm \Rightarrow 4 dice } (M1)
 6cm \Rightarrow 3 dice }
 $5 \times 4 \times 3 = 60$ dice (M1)
 OR
 Volume of box = $10 \times 8 \times 6 = 480$ } (M1)
 Volume of 1 dice = $2 \times 2 \times 2 = 8$ }
 Number of dice = $\frac{480}{8} = 60$ (M1)
 Answer 60 (A1) dice

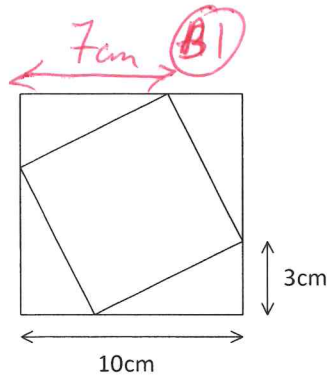
(Total 3 marks)

14. The area of a triangle is $1\frac{3}{5}$ cm². Its perpendicular height is $1\frac{1}{7}$ cm. What is the length of its base? Give your answer as a simplified fraction.

Base $\times \frac{1}{7} = 1\frac{3}{5}$ (M1)
 $\quad \quad \quad 2$
 Base $\times 1\frac{1}{7} = 1\frac{3}{5} \times 2$
 Base $\times \frac{8}{7} = 3\frac{1}{6}$ or $2\frac{6}{5}$ (A1)
 Base $\times \frac{8}{7} = \frac{16}{5}$
 Base = $\frac{16}{5} \div \frac{8}{7}$
 $= \frac{16}{5} \times \frac{7}{8}$ (M1)
 $= \frac{14}{5}$
 $= 2\frac{4}{5}$
 Answer $2\frac{4}{5}$ (A1) cm

(Total 4 marks)

15.



Big Area of big square = $10 \times 10 = 100 \text{ cm}^2$

1 triangle = $\frac{7 \times 3}{2} = \frac{21}{2}$ (M1)

4 triangles = $4 \times \frac{21}{2} = 42 \text{ cm}^2$ (M1)

Area of small square = $100 - 42$ (M1)

Answer 58 (A1) cm^2

(Total 4 marks)

16. The angles (in degrees) of a triangle are x , $2x - 19$ and $4x + 10$.

a) Write an equation for this.

$x + 2x - 19 + 4x + 10 = 180$ (A1)

b) Solve your equation to find x , showing your working out. Then use your solution to find the size of each angle.

~~3~~ $7x - 9 = 180$ (M1)

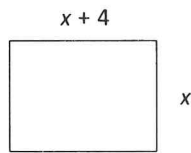
$7x = 189$

$x = 27$ (A1)

Answer 27 , 35 , 118 degrees (A1)

(Total 4 marks)

17. The width of a rectangle is x centimetres. The length of the rectangle is $(x + 4)$ centimetres.



a) Find an expression, in terms of x , for the perimeter of the rectangle. Give your expression in its simplest form.

Perimeter = $x + x + x + 4 + x + 4$
 $= 4x + 8$ (A1)

(1)

b) The perimeter of the rectangle is 54 centimetres. Work out the longer side of the rectangle.

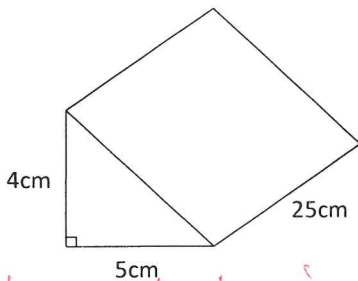
$4x + 8 = 54$ (M1)
 $4x = 46$ (M1)
 $x = 11.5$ (A1)

Longer side = $x + 4 = 11.5 + 4 = 15.5$
 Answer..... 15.5 (A1) (3)

(Total 4 marks)

18. A block of metal in the shape of a triangular prism (as shown below) is melted down and then the metal is made into two identical cubes. What is the length of one side of each cube?

NOT TO SCALE



Volume of triangular prism = $\frac{4 \times 5}{2} \times 25 = 250 \text{ cm}^3$ (M1)
 $\therefore 1 \text{ cube} = \sqrt[3]{\frac{250}{2}} = 125 \text{ cm}^3$ (M1)

Length of one side = $\sqrt[3]{125}$ (M1)

Answer..... 5 (A1) (Total 4 marks)

END OF THE TEST